DOCUMENT RESUME

ED 380 302 SE 055 990

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TITLE Rhetoric and Reality of Systemic Reform: A Critique of the Proposed National Science Education Standards.
INSTITUTION National Center for Science Teaching and Learning, Columbus, OH.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 95
CONTRACT R117Q00062
NOTE 7p.
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.) (120) -- Journal Articles (080)
JOURNAL CIT Cognosos; v4 n1 p1-3,7-8 Win 1995

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Standards; Criticism; *Educational Change; Evaluation Methods; *Science Instruction; State Standards
IDENTIFIERS *National Science Education Standards; National Standards; *Systemic Change

ABSTRACT

This article briefly reviews the central ideas associated with the notion of systemic reform and indicates how these ideas are manifested in the draft of the National Science Education Standards. The draft is critiqued and what the critique suggests about the viability and utility of the notion of systemic reform is considered. The discussion identifies problems associated with the implementation of a conceptual distinction between means and ends identified by rhetoric and discusses the use of vagueness to build coalitions of support. The possible implications of an approach that employs predefined content and skills operationalized in statewide assessment systems that meet traditional validity and reliability criteria is examined. The draft document's endorsement of authenticity combined with traditional validity and reliability criteria as a form of assessment is questioned. The report concludes that the National Research Council's "unifying vision" does not provide a foundation for a new form of educational decision making, one in which inevitable trade-offs and difficult choices are confronted and resolved. Furthermore, difficulties are found with the concept of systemic reform itself and that these problems could ultimately lead to failure. Contains 12 references. (LZ)

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The Rhetoric and Reality of Systemic Reform: A Critique of the Proposed National Science Education Standards

by
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The National Center for Science Teaching and Learning Research Quarterly

The Rhetoric and Reality of Systemic Reform:

A Critique of the Proposed *National Science Education Standards*

By Robert Donmoyer, National Center for Science Teaching and Learning

In November, 1994, The National Research Council distributed a draft of the *National Science Education Standards* for comment and critique. With the release of this draft, we have an opportunity not only to review the proposed *National Science Education Standards*; we also can begin to see how rhetoric about systemic reform will get played out in reality. The concept of systemic reform, after all, helped inspire and guide the development of the *National Science Education Standards*. The concept also has been endorsed by a number of other influential organizations interested in science education reform and educational reform more generally (e.g., The Business Roundtable, 1992; National Governors Association, 1991), and it has undergirded other major reform initiatives such as the National Science Foundation's (NSF) state, urban, and rural systemic initiatives and the American Association for the Advancement of Science's (AAAS) Project 2061.

Here I want to briefly review the central ideas associated with the notion of systemic reform and indicate how these ideas are manifested in the draft of the *National Science Education Standards*. Then I intend to critique the draft of the *National Science Education Standards* and consider what this critique suggests about the viability and utility of the notion of systemic reform.

What is Systemic Reform?

Systemic reform according to Marshal Smith, (the former dean of Stanford University's School of Education and currently an Under Secretary in the United States Department of Education) and his co-author, Jennifer O'Day is an attempt to replace the current "fragmented policy system" in which there is "little purposeful coordination" across educational policy initiatives and reform "with a coherent system of curriculum controls at the level of national and state governments" (Smith and O'Day, 1991, p. 244).

The key word here is *coherent*. Fuhrman and Massell (1992), in a document which further develops Smith and O'Day's notion of systemic reform, note that "some use the term [simply] to refer to comprehensive change that is focused on many aspects of the system [while] [o]thers stress the notion of policy integration, coordination or coherence around a set of clear outcomes" (p. 2). They go on to note that,

> the political system is more accustomed to the 'comprehensive' notion. Typically, legislatures build coalitions by bundling together many discrete programs. With omnibus or comprehensive approaches, many policymakers can share credit and satisfy diverse constituencies. More integrated approaches require trade-offs and difficult choices among policy options (p. 4).

Despite these trade-offs and difficult choices, Fuhrman and Massell make it clear that they—and Smith and O'Day—endorse the integration/coordination/coherence meaning of systemic reform. "The past failures of fragmented policy suggest that 'integration' is critical to reform that is truly 'systemic'" (p. 4), they write.

So how does this integration occur? How does one go about building Smith and O'Day's "coherent system of curriculum controls?" Smith and O'Day indicate that we must first develop "a unifying vision and goals" (p. 244). Then all other aspects of the system (e.g., preservice and inservice teacher education, tests and assessments, governance structures) must be reoriented toward accomplishing the agreed upon goals and making the newly agreed upon vision a reality.

One final point before proceeding: In addition to advocating "increasing coherence in the system through centralized coordination" (p. 254), Smith and O'Day also endorse—and incorporate into their notion of

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systemic reform—"increasing professional discretion at the school site" (p. 254).

How can Smith and O'Day embrace these two apparently contradictory ideas? They do it by distinguishing between means and ends and giving discretion for the former to the micro level and responsibility for determining the latter to macro level decision makers. "[W]hile schools have the ultimate responsibility to educate thoughtful, competent, and responsible citizens," Smith and O'Day write, "the state—representing the public—has the responsibility to define what thoughtful, competent and responsible citizen will mean in the coming decade and century" (p. 254). What do we get by parceling out responsibility in this way? According to Smith and O'Day, we "combine the vitality and creativity of bottom-up change at the school site with an enabling supportive structure at more centralized levels of the system" (p. 245).

"It is normally much easier to distinguish between means and ends at the level of rhetoric than it is in reality."

Systemic Reform and the National Standards

Systemic Reform advocates' influence is readily apparent in the November, 1994 draft of the *National Science Education Standards*. In the draft's introduction, for instance, we are told that the standards "provide a *vision* of learning and teaching science" and that they "provide assistance in making decisions and policies that will bring *coordination, consistency,* and *coherence* to the improvement of science education" (National Research Council, 1994, p. I-3, emphasis added).

As in the literature on systemic reform, talk of coordination, consistency, and coherence is quickly balanced by acknowledgments of the need for discretion and flexibility at the local level: "A hallmark of American education," the authors of the *National Science Education Standards* announce near the beginning of the document, "is local control, where boards of education and teachers make decisions about what their students will learn" (p. I-3). To further reassure advocates of local control, we are told that national standards simply,

> present criteria by which judgments can be made by state and local school personnel and communities. They are based on a vision, and they address a range of characteristics of school science *so people can decide* which curriculum, staff development activity, or assessment is appropriate. National Standards *provide assistance* in making decisions and policies that will bring coordination, consistency, and coherence to the improvement of science education (National Research Council, 1994, p. I-3, emphasis added).

Although the National Research Council astutely avoids using Smith and O'Day's (1991) straightforward talk of a "system of curriculum controls at the level of national and state governments" (p. 244), such a system is implicit in the National Research Council's talk of coordination, consistency, and coherence. Also, like Smith and O'Day (1991), the National Research Council uses the distinction between means and ends to smooth over the apparent contradictions in its rhetoric. "The standards describe outcomes," the National Research Council tells us, not the rate or manner in which students will achieve them...Decisions about programs and the means to accommodate the different rates of learning are left to curriculum developers, state and local school systems, and science teachers (National Research Council, 1994, p. I-7).

The authors of the draft also use Smith's means/ends distinction to endorse "students learning science by actively engaging in inquiries of interest and importance to them" (National Research Council, 1994, p. I-5), on the one hand, and statewide curriculum frameworks (which articulate predetermined outcomes) and statewide assessment systems (which determine whether curriculum framework developers' predetermined outcomes have, indeed, been met), on the other.

The Problem

There is a potential problem here: It is normally much easier to distinguish between means and ends at the level of rhetoric than it is in reality. Political scientist, Charles Lindblom (1968), in fact, observed long ago that we do not really know what our values are until we are forced to make hard choices about means, i.e., until we must decide how to spend limited financial resources or how to use precious commodities like teacher and student time. For Lindblom, therefore, the conceptual distinction between means and ends is, in essence, meaningless, because when we talk about ends without reference to hard choices about specific means, our talk is vague, and, consequently, trade-offs and hard choices are obscured.

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Vagueness as Political Strategy

Vagueness, in fact, is a favorite tactic of politicians intent on building a winning coalition. It is a strategy they use to forge agreements when agreement does not exist, and a method they employ to make adversaries allies (at least temporarily).

Vagueness, in other words, is one of the poles which holds up the politicians' "big tent." If the politicians' big tent is big enough (i.e. if their rhetoric is vague enough), all sorts of people with all sorts of differing and even contradictory views can be accommodated. The differences and contradictions, of course, are not really resolved; they are simply temporarily obscured. Eventually, those who implement the legislation that has been passed (or those who must enact the mandates endorsed at the polls) must confront the trade-offs that vagueness obscures. In the process of making hard choices about means, they will, in effect, finally decide which ends get endorsed and which get supported.

The vagueness strategy is very much in evidence in the National Research Council's draft document. The content standards in this draft, for instance, are even more vague than the content standards which appeared in earlier drafts sent out for review. Consider, for instance, the content standards which define what students should know and be able to do with respect to the topic of scientific inquiry. There are three inquiry-oriented standards, one each for grades K-4, 5-8, and 9-12. The standards are so vague that the exact same wording is used at each level: "[S]tudents will develop abilities necessary to do scientific inquiry [and] [u]nderstanding about scientific inquiry" (National Research Council, 1994, p. V-19). Less process-oriented content standards exhibit the same sort of vagueness. Consider, for example, the following content standard for science and technology at the middle grade level:

> **Content Standard E—5-8:**
> As a result of activities in grades 5-8, all students should develop
> - Abilities of technological design
> - Understanding about science and technology (National Research Council, 1994, p. V-91).

Readers desiring more specificity are simply referred to Project 2061's (1993) *Benchmarks for Science Literacy*. This document is also more than a little vague on some key points (Donmoyer, 1995), but it does offer rather extensive lists of relatively concrete (by comparison to the National Research Council's content standards, at least) outcomes which students are expected to have mastered by particular grade levels. Taxpayers might legitimately ask why so much time and effort, not to mention so many federal dollars, needed to be invested in articulating national content standards, if the content standards produced are so vague and the developers of those standards simply refer readers to more specific standards already developed by another group. The National Research Council's relative vagueness, however, serves a useful political purpose.

"Vagueness is one of the poles that holds up the politicians' 'big tent.'"

A brief anecdote demonstrates why this is so. Several years ago, I showed a draft of Project 2061's 1993 *Benchmarks for Science Literacy* to a well-known educational reformer. He was appalled. "Jim Rutherford [Project 2061's director]," he announced with great rhetorical flourish, "you've lost your way." The reformer went on to explain that he feared that teachers and curriculum developers who based their work on *Benchmarks for Science Literacy* would become so concerned with curriculum coverage—so involved with insuring that students had mastered the many benchmarks Project 2061 had articulated—that there would be no time to engage in the student initiated, problem oriented, somewhat improvisational form of teaching he—and also Project 2061 (see Chapter 13 of *Science for All Americans*, Rutherford and Alghren, 1990)—had endorsed. He said his fears would certainly become reality if Project 2061's benchmarks were translated into high stakes tests, and he cited, as support for his argument, an historical precedent in which high stakes tests drove curriculum and teaching in traditional directions despite rhetoric to the contrary.

I doubt that this reformer will have a similar reaction to the draft of the *National Science Education Standards*. Indeed, the relative vagueness of this document serves the National Research Council well in terms of garnering political support. The National Research Council, in fact, has been able to bring under one very big tent a large number of people with quite different educational philosophies—philosophies which in the past were thought to conflict (see, for example Eisner and Vallance, 1974).

The National Research Council's "Big Tent"

Accountability-minded folks, including those who believe education is largely a process of mastering the content of the academic disciplines,[1] will be pleased by the more or less traditional discipline-based organization of the content standards and the promise that the standards will be made more specific in state level curriculum frameworks. Similarly those who believe predefined content and skills can and should be sequenced incrementally and mastery of such content and skills can and should be measured at various points along the way[2] will be happy to know that content standards will be operationalized in statewide assessment systems; systems which, Chapter IV of the draft document assures us, will be both authentic and sufficiently standardized to meet traditional validity and reliability criteria. At the same time, for less hardheaded, more romantic souls who believe that education should be more of a student-centered quest for personal meaning[3] and a largely student initiated process of inquiry,[4] and who

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consequently assume that teaching must be more of a serendipitous, reactive and responsive process than a pre-planned and proactive one, the standards document provides a series of charming vignettes about what classroom life will look like after the standards have been enacted.

"Somewhere, John Dewey must be looking down and smiling."

In one vignette, for instance, an elementary school teacher spontaneously fashions a series of lessons to teach content standards related to both scientific inquiry and the physical properties of matter from a student's observation that the water in the watering can used to water classroom plants had disappeared over the weekend. When no student admits to drinking or spilling the water, the teacher asks what happened to it. One student hypothesizes that Willie, the pet hamster, must be getting out of his cage at night and drinking the water. The students decide to test this hypothesis by covering the watering can so Willie will not be able to drink the water. When no more water disappears, the students conclude that Willie was, indeed, the culprit.

At this point, the teacher once again intrudes and asks how they can be sure that the guinea pig did it. The students concoct an ingenious plan. They place the guinea pig's cage in the middle of the sand table each night, smooth the sand, and check the following morning for footprints.

After a bit more of this sort of experimentation, the students become convinced that their ideas about Willie are indeed wrong, and the teacher takes advantage of this teachable moment to suggest some experiments to help her students observe and better understand the phenomenon of evaporation. Even, at this point, the teacher remains attentive to what students do and say. A student's comment about her mother's use of a dryer to dry clothes and her observation that the clothes take longer to dry when her mother does not turn the dial to heat, generates a new round of experimentation to determine whether water does, indeed, disappear faster when it is warmer.

Somewhere, John Dewey must be looking down and smiling. But given the National Standard's emphasis on the mastery of predetermined content and the need to measure whether mastery has indeed occurred, E. L. Thorndike and B. F. Skinner must also be pleased (or at least appeased). The National Research Council has indeed constructed a big tent under which those who normally disagree can gather. Like traditional politicians who support both subsidies for tobacco farmers and programs to persuade citizens to stop smoking, the National Research Council has built a powerful coalition by constructing a vision of reform which promises something for virtually everyone.

A Likely Retort

At this point, the National Research Council's defenders can be expected to object: The National Research Council's big tent is fundamentally different from the big tents constructed by politicians, they will argue. While politicians' big tents are built on vagueness and obfuscation, the National Research Council's big tent is grounded in a creative synthesis; this synthesis *legitimately* accommodates what were previously thought to be antithetical points of view.

"Exhibit A" in support of this argument will almost certainly be the draft document's support of authentic assessment. When we operationalize this concept—and the draft document does provide some rather concrete examples of how this might be done—it appears as if we can indeed *legitimately* accommodate rival points of view. We can, for instance, satisfy those with accountability concerns yet still accommodate those disciples of John Dewey who nod with approval when they read the draft document's disappearing water vignette which was summarized above. This latter group, after all, never quarreled with assessment, per se; their quarrel was with the inauthentic character of standardized tests and the tendency for these tests to lead to inauthentic teaching and learning. When we make assessment authentic, so the argument goes, we will be able to use the potent tool of assessment to drive curriculum and teaching in a very different direction, in fact, the direction Dewey's disciples would like to see them head. Thus, advocates of accountability and advocates of more student-centered teaching and learning can legitimately come together under the big tent the National Research Council has created.

"E. L. Thorndike and B. F. Skinner must also be pleased (or at least appeased)."

The problem here is that the *National Science Education Standards* related to assessment not only endorse authenticity; they also endorse traditional validity and reliability criteria. This latter endorsement, in turn, implies support for a rather high degree of standardization, and there is at least some face validity to the charge that standardizing authenticity is an oxymoron. The untimely demise of California's efforts at statewide performance assessment (Page, 1995) and the disastrous experience with performance assessment in science education in Great Britain (Black, 1993) provide empirical support for this point of view. Once again it appears as if it may be easier to give something to everyone rhetorically than it is in reality.

Conclusion

So the National Research Council's "unifying vision" does not provide a foundation for a new form of educational decision making, one in which inevitable trade-offs and difficult choices are confronted and resolved. Rather the national standards the National Research Council has drafted are themselves products of the very sort of bargain-

ing and "big tent" comprehensive politics systemic reform advocates criticize. Consequently, the unifying vision the National Research Council has articulated actually obscures the trade-offs and difficult choices which eventually will have to be made.

Furthermore, the difficulty is not so much with the way the National Research Council has implemented the systemic reform concept; the fundamental problem is with the concept itself. Smith and O'Day's (1991) neat and tidy means/ends distinction which works so well in the realm of rhetoric—including rhetoric about systemic reform—gets quite messy when we move from rhetoric to reality. We must realize, therefore, that in reality we may not be able to have it all and that trade-offs will have to be confronted and hard choices will still have to be made even after a "unifying vision" has been created. At the very least, we should openly acknowledge the task we have delegated to curriculum developers, test makers, *and especially teachers*, and we should not be surprised nor should we blame them when they fail to do the impossible. ■

This article appears in the Theory Into Practice *special theme issue on "Reforming Science Education" which reports on the NCSTL research agenda on policy and school organization. For a copy send an $8 check payable to Ohio State—Theory Into Practice, 146 Arps Hall, 1945 N. High St., Columbus, OH 43210.*

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Notes:

1 Eisner and Vallance (1974) label this an academic rationalist conception of curriculum.
2 Eisner and Vallance (1974) label this a curriculum-as-technology view.
3 Eisner and Vallance (1974) label this a self actualization conception of curriculum.
4 This is a cognitive processing orientation, in Eisner and Vallance's (1974) conceptual scheme of "conflicting conceptions of curriculum."